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Nurse-led diabetes management in remote locations

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Introduction: Nurse-led diabetes management has been shown to be effective in urban and regional general practice. We sought to test the feasibility of providing a nurse-led annual cycle of diabetes care in a remote location and to explore the factors that patients indicated were important in diabetes self-management.
Methods: We conducted a pilot study in 3 locations: 1 town and 2 small townships in remote Australia. A chronic disease nurse (CDN) visited each patient over the course of a year. We examined patient clinical outcomes and interview data. We estimated the cost per hour of the CDN's time, including travel time, per 1% drop in glycated hemoglobin (HbA_{1C}).
Results: A total of 21 patients participated in the pilot study. Clinical findings showed significant reductions in HbA_{1C} levels after the nurse-led intervention. Patients reported that they trusted the nurse and thought her advice was pitched at their level. Patients were motivated through a process that included emotional response, change identity and acceptance. The estimated cost in CDN hours per 1% drop in HbA_{1C} level was A$242.95 (Can$237.60).
Conclusion: Nurse-led diabetes care motivated patients to manage their diabetes and resulted in a significant improvement in diabetes management in this remote setting.

Introduction : En milieu urbain et en région, la prise en charge du diabète par le personnel infirmier s'est révélée efficace en médecine générale. Nous avons voulu vérifier s'il est envisageable de fournir un cycle annuel de soins infirmiers pour le diabète dans un secteur éloigné et étudier les facteurs que les patients jugent déterminants pour assurer eux-mêmes la gestion de leur diabète.
Méthodes : Nous avons réalisé une étude pilote à 3 endroits : 1 municipalité et 2 petits villages d'une région éloignée de la campagne australienne. Une infirmière spécialisée en maladies chroniques (ISMC) a rendu visite à chaque patient sur une période d'un an. Nous avons examiné les résultats cliniques des patients et les données des entrevues réalisées avec eux. Nous avons estimé le coût horaire du temps des ISMC, incluant leurs déplacements, par tranche de 1 % de réduction de l'hémoglobine glyquée (HbA_{1C}).
Résultats : En tout, 21 patients ont participé à l'étude pilote. Les observations cliniques ont révélé des réductions significatives des taux d'HbA_{1C} après l'intervention en soins infirmiers. Les patients ont dit faire confiance à l'infirmière et ont trouvé ses conseils bien adaptés à leur situation. Les patients ont été motivés par le biais d'une intervention axée sur les dimensions affectives et identitaires et sur l'acceptation. Le coût horaire des ISMC par tranche de 1 % de réduction du taux d'HbA_{1C} a été estimé à 242,95 $A (237,60 $CA).
Conclusion : Les interventions en soins infirmiers ont motivé les patients à gérer leur diabète et ont entraîné une amélioration significative de sa prise en charge dans cette région éloignée.

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INTRODUCTION

Diabetes is significantly more prevalent in rural than in metropolitan areas.[1–3] Nurse-led models of chronic disease management can be a solution to the predicted inability of the general practitioner (GP) workforce to meet the growing demand for chronic disease care.[4] In Australia, "general practitioner" is synonymous with the Canadian term family physician. There is a shortage of GPs in rural and remote locations in Australia, which has led to a lack of continuity in medical supervision.[5] Rural residents delay seeking health care and use medical services less frequently than their urban counterparts.[6–9] Nurse-led programs have been proven effective in Australian urban and rural settings,[10,11] and in the United Kingdom.[12]

The Chronic Care Model identifies interventions that encourage self-management skills in patients.[13] Key elements include patients taking on an active role in their care and health professionals being more proactive in changing patient behaviour.[13] For health professionals to increase self-management rates, they need to understand the factors involved in changing patient behaviour.[14–17]

Recent evidence has shown that patients with diabetes who completed a cycle of care using a GP management plan had improved process and clinical outcomes.[18] The aim of this study was to test the feasibility of a nurse-led annual cycle of diabetes care in a remote location and to explore the factors that patients indicated were important in diabetes self-management.

METHODS

Intervention

The nurse-led cycle of diabetes care was developed from evidence-based protocols implemented by the chronic disease nurse (CDN) under the medical supervision of GPs in a shared care model. The same nurse visited each patient over the course of a year, from February 2013 to February 2014. Patients' weight and girth were measured at the beginning and at the end of the pilot, and advice was given about medications, diet, weight loss and exercise. In addition, lifestyle changes were reviewed at quarterly intervals by the CDN under GP supervision, thereby conforming with the diabetes management guidelines of the Royal Australian College of General Practitioners.[19] The study sites, which were all in New South Wales, were a remote township with outreach services and no resident nursing or medical services, a remote township with resident nursing services and outreach services, and a town with resident nursing and medical services. Both remote townships were provided with visiting outreach nursing and medical services. Patients consented to researchers accessing their clinical records. We estimated the cost per hour of the CDN's time, including travel time, per unit drop in glycated hemoglobin (HbA_{1C}).

Quantitative analysis

Quarterly clinical outcomes and lifestyle changes were collected from the patient records of all patients involved in the pilot and analyzed by 2 researchers (S.K. and T.M.). Categorical variables were created for patient demographics (age, sex, living alone/with other, medications) and outcomes (HbA_{1C} level, glomerular filtration rate, weight) for analysis. Statistical calculations of bivariate correlations were performed using SPSS version 21.

Qualitative analysis

Patients were provided with information about the study and invited to participate. Attempts were made to contact all patients in the pilot, either by telephone or in person when they visited the clinic. One of the researchers (S.K.) conducted the interviews, which were done face-to-face in the clinic or by telephone, whichever was convenient for the patient. The interview questions covered perceptions of diabetes care before and during the nurse-led care and lifestyle adjustments necessitated by diabetes. Interview recordings were transcribed for analysis using NVivo 10. Initial coding identified emerging themes. Secondary theoretically informed analysis identified elements in the process of patients shifting from passive to active self-managers of their disease.[15,16] Coding was checked by an independent researcher to ensure the integrity of themes and to provide validation of the interpretation.

The University of Sydney Human Research Ethics Committee approved the study.

RESULTS

Quantitative results

A total of 21 patients took part in the pilot study. Three patients were from a remote township with outreach services and no resident nursing or medical services, 8 were from a remote township with resident nursing services and outreach services, and 10 were from a town with resident nursing and medical services. All

participants completed the annual cycle of diabetes care. A summary of results including patient characteristics are reported in Table 1. The program resulted in a modest but significant mean reduction in HbA_{1C} levels of 0.7% ($t_{20} = -2.43$, $p < 0.05$; 95% confidence interval –1.27 to –0.10; paired sample 2-tailed) but no significant differences in weight or glomerular filtration rate. Medication regimen, living alone, age, sex and patient location had no significant influence on patient outcomes (Pearson 2-tailed correlation tests $p < 0.05$).

The cost per hour of the CDN's time was A$26.92 (Can$26.38) (Registered Nurse Level 2, Paypoint 4). The estimated cost of patient care, in terms of CDN hours per patient for the annual cycle of care, was 4 direct and 4 indirect hours of care, totaling 8 hours per patient. Indirect care refers to file notes, appointments and referrals. The estimated mean travel time per remote location was 8 hours per clinic visit, equating to 32 hours per year for the 11 patients in remote townships, or 2.9 hours per patient. The estimated average total care per patient, including travel time, was 10.9 hours in the annual cycle of care for an average drop in HbA_{1C} levels of 0.7% or the equivalent of 15.57 hours for a drop in HbA_{1C} of 1%. The estimated cost in nursing hours per 1% drop in HbA_{1C} level is therefore A$242.45 (Can$237.60).

Table 1: Patient characteristics and summary of clinical results, *n* = 21

Variable	No. (%) of patients*
Sex, female	11 (52)
Living alone	5 (24)
Living with spouse/partner or family	16 (76)
HbA_{1C} levels, %	
≤ 7, baseline	11 (52)
≤ 7, end of study	13 (61)
Age, yr	
> 50	15 (71)
< 40	4 (19)
41–50	2 (10)
51–60	4 (19)
61–70	7 (33)
71–80	4 (19)
Weight, mean (range), kg	
Baseline	102 (67–143)
End of study	100 (67–140)
Medications	
Insulin	6 (29)
Oral antidiabetic drugs	8 (38)
Combination insulin and oral antidiabetic drugs	2 (1)
No antidiabetic medication	5 (24)

Note: HbA_{1C} = glycated hemoglobin.
*Unless stated otherwise.

Qualitative results

All 11 patients who were interviewed had a good relationship with the CDN and reported that her advice was easy to understand and helpful. "She ... brings it down to — well — to the layperson's level," said one female patient. Patients indicated that longer consultations with the CDN allowed more time for patients to absorb information.

All 11 patients interviewed reported that they trusted the CDN and that the trust was important in acting on her advice. One patient described the CDN as her "saviour."

Patients who were self-managing their diabetes identified the CDN relationship as the trigger for self-management. One female patient stated, "... you've got someone who's interested ... someone who cares. ... Well, I think it's the motivation to do something more positive for yourself because ... no one can change things in your life except yourself." The encouragement provided by the CDN was appreciated by patients. They were proud to report weight loss or diet change.

Patients talked about a transition in which they experienced an emotional response to living with diabetes. Some patients were able to deal with the emotions and move on. For others, it was more difficult. The elements in the process of self-management are schematically represented in Figure 1. One male patient said, "It's when you've been healthy for such a long while then it hits you."

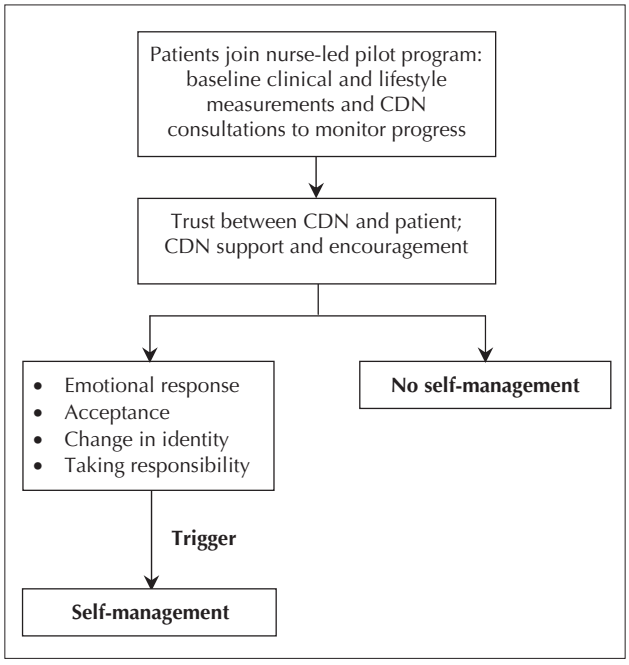


Fig. 1. Schematic representation of the process of patient activation. CDN = chronic disease nurse.

Patients' transition to self-management involved accepting the condition, and changing their identity to a person with a chronic disease. Patients acknowledged the role of the CDN in their ability to accept diabetes. "I swept it under the carpet. ... I realized my health was getting worse and wouldn't improve unless I did something. It was a real eye-opener. She [the CDN] got me back on track," said one male patient.

The identity change, from healthy to living with diabetes, was difficult for some in spite of their rapport with the CDN. One patient who had had an active lifestyle before he had diabetes reported that he was disappointed in himself for not being able to adjust diet and exercise. He was unable to accept his diabetes and relinquish his previous identity:

> I'm not the sort of person who can modify my food intake ... even though I've cut down a lot. ... I eat all of ... the greens and carrot and have minimal amount of potato and try to do all the right things, and then I go have my HbA_{1C} tested and it's 9, you know, so I lose heart very quickly.

Interview data revealed that some patients made the transition to accepting and managing their diabetes within the year's cycle of care. Others, although they reported a good relationship with the CDN and had insight into their inability to address lifestyle issues, were not self-managing. Levels of HbA_{1C} were 7% or lower in all patients who identified themselves as self-managing.

One patient had previously unrecognized low literacy and was therefore unable to read the medication instructions. The CDN arranged for the patient's family to attend the next consultation to explain the instructions.

DISCUSSION

About two-thirds of participants in this study achieved target levels of HbA_{1C}, compared with about half of the Australian population with diabetes.[20,21] In this study, a nurse-led cycle of diabetes care with GP supervision was successful in remote locations in New South Wales. Many qualitative analyses of patients living with diabetes have explored the reasons underpinning active patient self-management, but few have correlated the qualitative data with clinical data.[22]

For nurse-led programs to flourish, special training on the social, psychological, emotional and motivational aspects of diabetes is needed to improve the uptake of self-management.[4,10] The finding that positive reinforcement for lifestyle changes encouraged patients to self-manage has also been reported in other studies.[23,24]

Longer consultations with CDNs promoted fuller discussions and allowed for complex issues to be addressed more fully, in contrast to shorter GP consultations. In addition, the longer consultations facilitated the provision of individualized medication and lifestyle management advice and allowed time for patients to understand the advice.

The modest estimated cost per patient per 1% drop in HbA_{1C} levels shows that this program was cost-effective.

Although patients understood their disease and responsibilities in managing diabetes, some were unable to make diabetes management a high priority in their lives.[20] The patient-related factors identified in this study align with reports that patients move through an emotional response, to changing identity and lifestyle, to acceptance and self-management.[15,16,25] Studies have also reported that some patients need more support for self-management than others.[26] Failure to engage in self-management may be related to low personal resources impairing interactions with health professionals.[23,27] The linking of results to theoretical frameworks of self-management confers additional rigour to the study.

The pilot program has been adopted on the basis of the results of this study, across the area in which the organization provides services. The application of this model to other locations in Australia and internationally would need to take into account the contextual factors in play as specified under the Dynamic Sustainability Framework, which details the importance of consideration of local factors in translation of models developed in other locations.[28] The following factors may be important: the nurse's skills in chronic disease self-management, including skills in communication and coordination of care; acceptance by supervising medical officers; community and patient perceptions of the nurse-led program; and continuity of care. Service models research has focused on rural and regional settings rather than on remote settings. More research is needed to test models of care that produce improved outcomes; this will secure the evidence base for interventions that are effective in remote communities.

Limitations

The small sample is a study limitation. However, the sparse populations of remote communities make small samples a reality of research in remote areas. Another limitation is that 10 of the 21 participants in the qualitative arm of the study could not be interviewed because they left the area, declined or

could not be contacted. A possible bias is that study participants formed a close relationship with the CDN and may have been more likely to report positive rather than negative experiences. Data collection was separated from the provision of services. There are no data on the relationship between the patient and the CDN for participants who were not interviewed. Patient factors such as health literacy and education level are relevant to considerations of self-management.[22] It is a limitation of this study that neither patient educational levels nor measurement of health literacy were collected. Evidence on the relation between education levels and health literacy on the ability to self-manage diabetes would be of benefit in future research.

CONCLUSION

A nurse-led year-long cycle of diabetes care supervised by GPs achieved a significant improvement in diabetes management in this remote setting. The program resulted in a mean decrease of 0.7% in HbA_{1C} levels. Factors important in motivating patients toward self-management were trust in the CDN, CDN support, personal resources and making lifestyle management a priority.

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